

Insect Allergy

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Must Know For Boards (I Think)

- Honey bee sensitivity is most complicated but not most likely to cause sting unless beekeeper. Full protection with IT occurs in 80-90% of subjects treated with honey bee compared to 95-98% for *Vespula*. Reactions to IT occur in 20-40% of honey bee venom treated subjects but only in 5-15% of vespid venom treated.
- Old world hornets are not currently used for testing or IT with white and yellow faced hornets being related to yellow jackets (know taxonomy).
- Fire ant venom is mostly alkaloid and whole body extract is used for testing and treatment. WBE is effective for testing and treatment based upon available data.
- NO TREATMENT for children < 16 years old for hymenoptera allergy although some experts recommend treating imported fire ant sensitive children with cutaneous reactions. No data are available confirming low rate of serious systemic reactions in children subsequently stung by fire ants following a cutaneous systemic reaction.
- Local reactions should not be tested and should not be treated with immunotherapy.
- Duration of immunotherapy is controversial but know reasons not to stop:
 - ~ Original reaction severe
 - ~ Anaphylaxis during immunotherapy
- Imported fire ant causes pustules, not other sting likely with this history.
- Know Table on page 1480 of most recent Middleton (on handout below).
- Kissing bug, triatoma, most likely biting insect to cause anaphylaxis (usually at night and in Western states).
- Know manifestations and treatment of anaphylaxis (Phil Lieberman's review excellent). Give epinephrine IM and have patient lie down to avoid "empty heart syndrome". Treatment for anaphylaxis is the same with beta blocker therapy except consider glucagon after initial epinephrine.
- Issue related to compensation of venoms
 - ~Honey bee: mellitin, phospholipase A2
 - ~Vespids: phospholipase, Antigen 5
 - ~ Imported fire ant: alkaloids (non allergenic), some similarity to vespids
 - ~ "Killer Bees": identical to honey bee
- If convincing history, perform in vitro test if skin test negative; repeat in 6 weeks if both negative. Provide epinephrine autoinjector even if allergy testing negative. Epinephrine for local reactions or cutaneous anaphylaxis (Grade I anaphylaxis) in children is controversial.

- Serum tryptase is not always elevated in anaphylaxis so do not eliminate from differential diagnosis if negative. Some evidence of increased occurrence of mastocytosis in subjects with insect anaphylaxis (recent publication) so keep in mind if total tryptase is elevated.

- Size of reaction with skin tests or level of specific IgE with in vitro testing do not correlate with severity.

Key Points

- Any type of systemic reaction to Hymenoptera stings in adults warrants testing and consideration of immunotherapy.

- Cutaneous anaphylaxis following Hymenoptera stings in children, 2-16 years of age, should not be tested or treated. Imported fire ant (IFA) reactions with urticaria in children are controversial and test questions are not likely. Many clinicians would test and treat these children as data are not available for IFA cutaneous anaphylaxis and avoidance is very difficult.

- Respiratory symptoms occur with equal frequency in about 40% of children and adults. Cardiovascular signs and symptoms are common in adults (30%) but infrequent in children (10%).

- Patients with systemic mastocytosis are at a high risk to develop severe or even fatal cardiovascular sting reactions. Two studies indicate that severe cardiovascular reactions are associated with an elevated baseline serum tryptase (>11.4 ng/ml) in up to 25% of individuals, indicating an increased whole-body mast cell load as a risk factor for life threatening sting reactions. A routine baseline serum tryptase may be a consideration in patients with systemic sting reactions.

- Honey bee leaves the stinger in the skin but *Vespula maculifrons* also leaves the stinger in 30-50% of cases.

- Duration of immunotherapy is controversial and probably will not be on examination. If anaphylaxis occurs during treatment, either to stings or allergy injections, or if the original sting reaction was severe or life threatening, immunotherapy should probably not be stopped unless the skin test becomes negative (high-risk subject). Stopping after 3-5 years, with or without documentation of a decrease in skin test reactivity, is a consideration with milder anaphylactic history but too controversial for test questions.

- Skin test reactivity to venom becomes negative in 25% of treated subjects after 5 years of venom immunotherapy, 60-70% are negative after 7-10 years of immunotherapy. After 5 years of venom immunotherapy and discontinuation of treatment, the risk of a systemic reaction following a sting is 10%, but most reactions are mild. However, high-risk subjects have an increased risk and should be treated longer (see above).

- Skin testing should be performed with venoms at a concentration of 1 microgram/ml or less and imported fire ant whole body extract 1:500 w/v or less.

- Venoms from *Vespa* or vespids, yellow jackets, yellow and bald- (white-) faced hornets and to lesser extent wasps, demonstrate extensive cross reactivity. Yellow jacket and wasp commercial venoms are blends of several species. *Polistes dominulus* is not included in wasp but is not a frequent cause of anaphylaxis.

- Hyaluronidase and phospholipase are common to most venoms but differ among species. Venom proteins have almost no cross reactivity between families, although hyaluronidases may show minimal cross reactivity. Phospholipases do not cross react between families.

- Honey bee venom is standardized based upon phospholipase A, vespid venoms are standardized based upon hyaluronidase.

- Mellitin is unique to honey bee venom and is almost 50% of all protein. Phospholipase A2 in *Apidae* and Phospholipase A1 in *Vespidae* are the most common antigens resulting in sensitivity. Antigen 5 is the most potent allergen in vespids. IFA venom is primarily alkaloids with a small minority an aqueous solution of proteins some of which are similar to other venoms. The alkaloids cause the sterile pustule but have nothing to do with allergy.

- Biting insects generally do not cause anaphylaxis with the exception of triatoma bugs. These are usually found in Western US and primarily bite at night. No approved treatment available. No allergy treatment recommended for fleas, mosquitos, flies, midges or other biting insects.

- Local reactions, contiguous with the site of sting, should not be tested or treated with immunotherapy. Treatment includes conservative management with ice, antihistamine for itch and possibly systemic corticosteroids for 3-5 days.

- All venoms to which an individual has significant specific IgE should be used in treatment. The history should not be used to determine which insect venom is used for treatment, although some authorities disagree with this approach. Test questions will probably not probe this topic but if asked respond with the idea all venoms to which sensitivity is demonstrated are used for therapy. The exception would be IFA as the sterile pustule identifies the sting as an IFA and other Hymenoptera testing and treatment are not necessary.

- Honey bee hypersensitivity is probably the most severe and long lasting although yellow jacket causes the most reactions in general. The latter is due to the aggressive behavior of yellow jackets. IFA is most common cause of insect anaphylaxis in the Gulf Coast states.

- A convincing history with negative skin testing warrants in vitro specific IgE testing. If the latter is negative, skin testing should be repeated in 4-8 weeks before accepting results as negative.

- Twenty-one to 73% of subjects with a positive history and presence of specific IgE will react when stung intentionally. The mean is 45% but some reviews indicate 60% will react. This reaction rate decreases with time, approximately 25% will react after 7-10 years. Immunotherapy reduces risk to approximately 10% after 2 years of treatment, less than 5% after 3-5 years of treatment.

- After 10 years and without immunotherapy, specific IgE in children with history of systemic reactions is undetectable in 25-50%.

- Local reactions during immunotherapy or following insect stings do not predict likelihood of future systemic reactions from stings or treatment.

- Neither the concentration of specific IgE nor the size of the wheal and flare response on skin testing predicts the likelihood of a systemic reaction or the severity of the reaction. The maximum concentration of venom used for testing is 1 microgram/ml to preserve specificity of the testing.

- IFA whole body extract contains sufficient protein for testing and immunotherapy although purified venom is superior for both. IFA venom is not commercially available.

- Measurement of IgG antibody to venom proteins is not useful clinically.

- Harvesters ants (*Pogonomyrmex*), sweat bees and jumper ants (*Myrmecia*) sting if provoked and may rarely cause anaphylaxis.

- The venom-specific IgE level and skin test sensitivity usually increase in the first months of therapy, return to baseline after 12 months, and then decline steadily during maintenance treatment. This decline continues even after therapy is stopped or after a sting. Even after 3 to 5 years of treatment, these tests turn negative only in a minority of patients. Less than 20% of patients are skin test negative after 5 years, but 50-60% become negative after 7-10 years. Specific IgE may decrease more rapidly than skin sensitivity but also may persist at very low levels even when venom skin tests become negative.

- Memorize this table from Middleton, page 1480.

Table 81-2. Risk of Systemic Reaction in Untreated Patients with History of Sting Anaphylaxis and Positive Venom Skin Tests

Original Sting Reaction		Risk of Systemic Reaction (in percent)	
Severity	Age	1-9 yr	10-20 yr
No reaction	Adult	17	
Large local	All	10	10
Cutaneous systemic	Child	10	5
	Adult	20	10
Anaphylaxis	Child	40	30
	Adult	60	40

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Graft KF, Golden DBK, Reisman RE et al. The discontinuation of hymenoptera venom immunotherapy. Report from the Committee on Insects of the American Academy of Allergy Asthma and Immunology. J Allergy Clin Immunol 1998;101:573-75.

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Ludolph-Hauser D, Rueff F, Fries C, Schöpf P, Przybilla B. Constitutively raised serum concentration of mast-cell tryptase and severe anaphylactic reactions to Hymenoptera stings. Lancet 2001; 357:361-362.

Hypersensitivity to Hymenoptera Insects (Insect Stings)

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Must Know for Boards, I Think

- Honey bee is associated with greater risk and less effective response to IT
- Old world hornets are not currently used for testing or IT with white and yellow faced hornets being related to yellow jackets (know taxonomy)
- Fire ant venom is mostly alkaloid and WBE is used for testing and treatment
- < 16 years with cutaneous reactions for hymenoptera **NO Immunotherapy**

Must Know for Boards, I Think

- Local reactions should not be tested or receive IT
- Duration of IT controversial but know reasons not to stop
- IFA causes pustules, no other sting likely
- Table on page 1480 of most recent Middleton
- Kissing bug, triatoma, most likely BITING insect to cause anaphylaxis (usually at night and in Western states)

Must Know for Boards, I Think

- Manifestations and treatment of anaphylaxis, especially IM epinephrine and have patient lie down (treatment same with beta blocker except **consider** glucagon)
- Composition of venoms
 - Honey bee: mellitin, phospholipase A2
 - Vespids: phospholipase, Antigen 5
 - IFA: alkaloids, some similarity to vespid
 - “Killer bee” almost identical to honey bee

Must Know for Boards, I Think

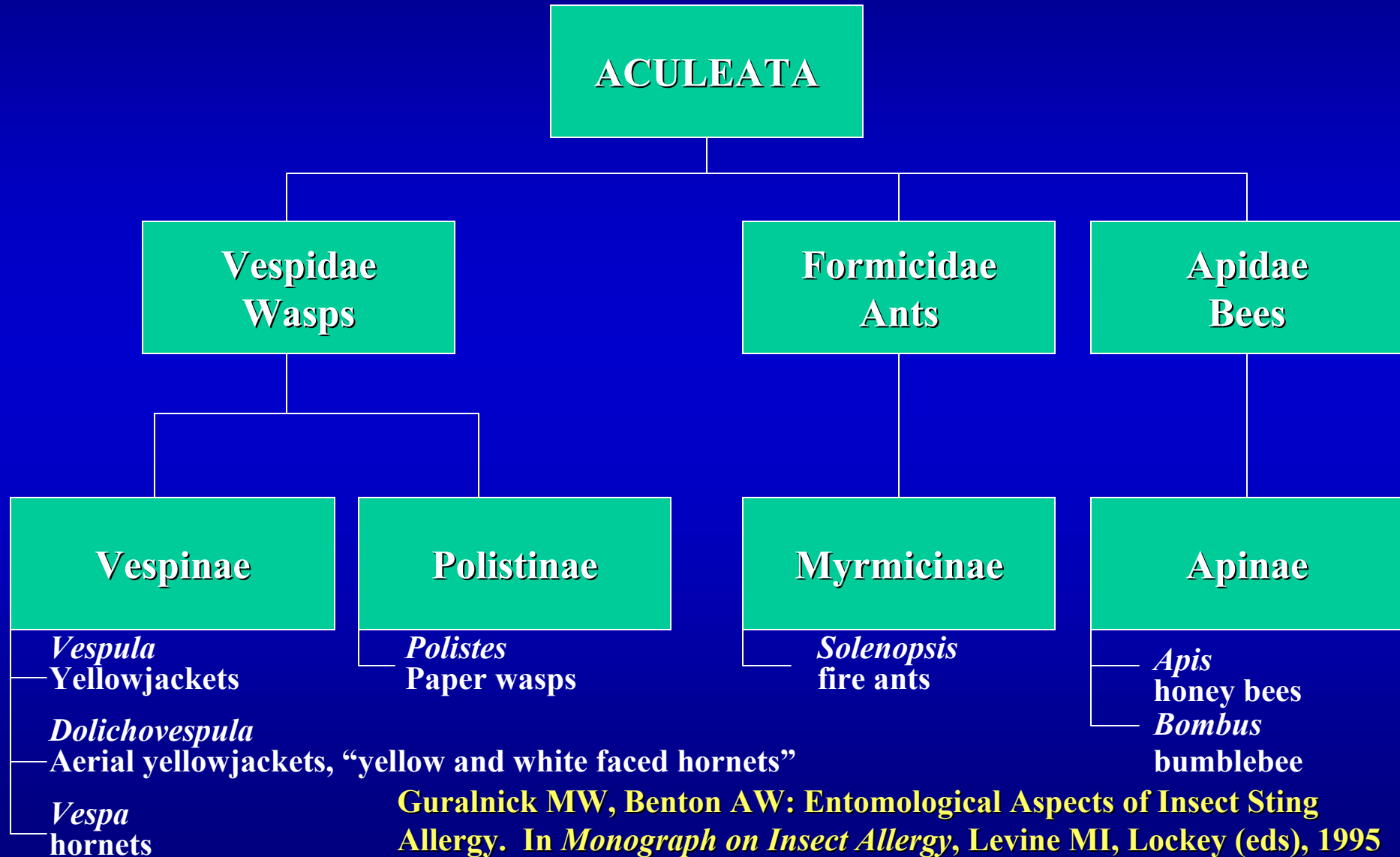
- If convincing history perform in vitro test if skin test negative and repeat in 6 weeks; give epinephrine even if negative (epinephrine for local reaction or cutaneous in children controversial)
- Tryptase is not always positive
- Size of reaction to ST, level of IgE on in vitro do not correlate with severity
- Severity of reaction history determines need for IT, duration IT and risk of IT

Insects Reported to Cause Allergy in Humans

- Order Coleoptera – beetles
- Order Diptera – flies, mosquitos, midges
- Order Ephemeroptera – mayflies
- Order Hemiptera – aphids, bed bugs, and kissing bugs
- Order Hymenoptera – ants, bees, and vespids
- Order Lepidoptera – moths and caterpillars
- Order Orthoptera – cockroaches
- Order Siphonaptera – fleas
- Order Trichoptera – caddis flies

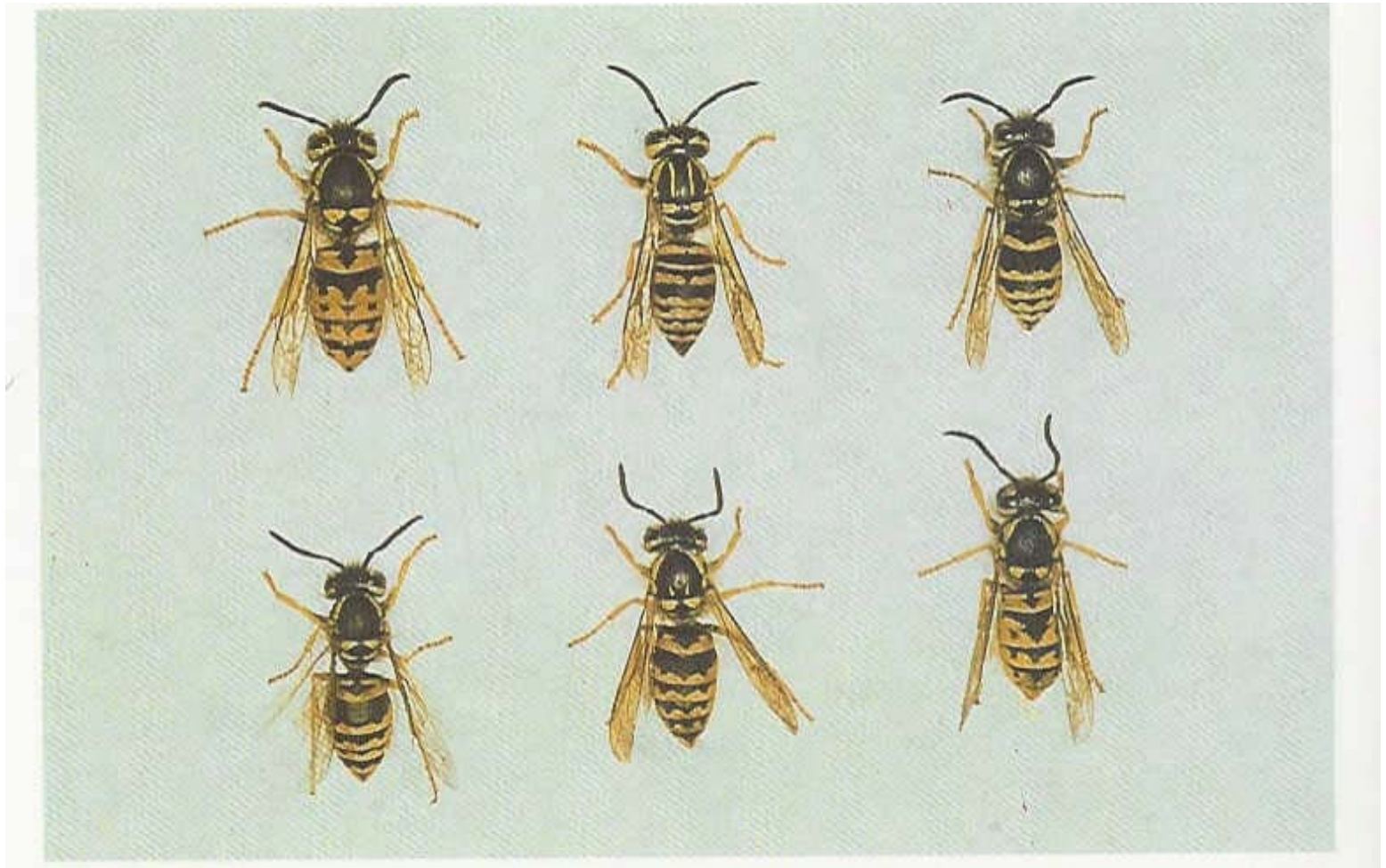
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TAXONOMIC RELATIONSHIP OF MEDICALLY IMPORTANT HYMENOPTERA



Guralnick MW, Benton AW: Entomological Aspects of Insect Sting Allergy. In Monograph on Insect Allergy, Levine MI, Lockey (eds), 1995





Six North American yellowjackets - top row from left to right: *Vespula pensylvanica*, *V. squamosa*, *V. vulgaris*. Bottom row from left to right: *V. maculifrons*, *V. flavopilosa*, *V. germanica*.

Guralnick MW, Benton AW: Entomological Aspects of Insect Sting Allergy. In *Monograph on Insect Allergy*. Levine MI, Lockey RF (eds), 1995



Vespula squamosa and *Vespula maculifrons* workers feeding on a peanut butter and jelly sandwich.

Guralnick MW, Benton AW: Entomological Aspects of Insect Sting Allergy. In *Monograph on Insect Allergy*. Levine MI, Lockey RF (eds), 1995





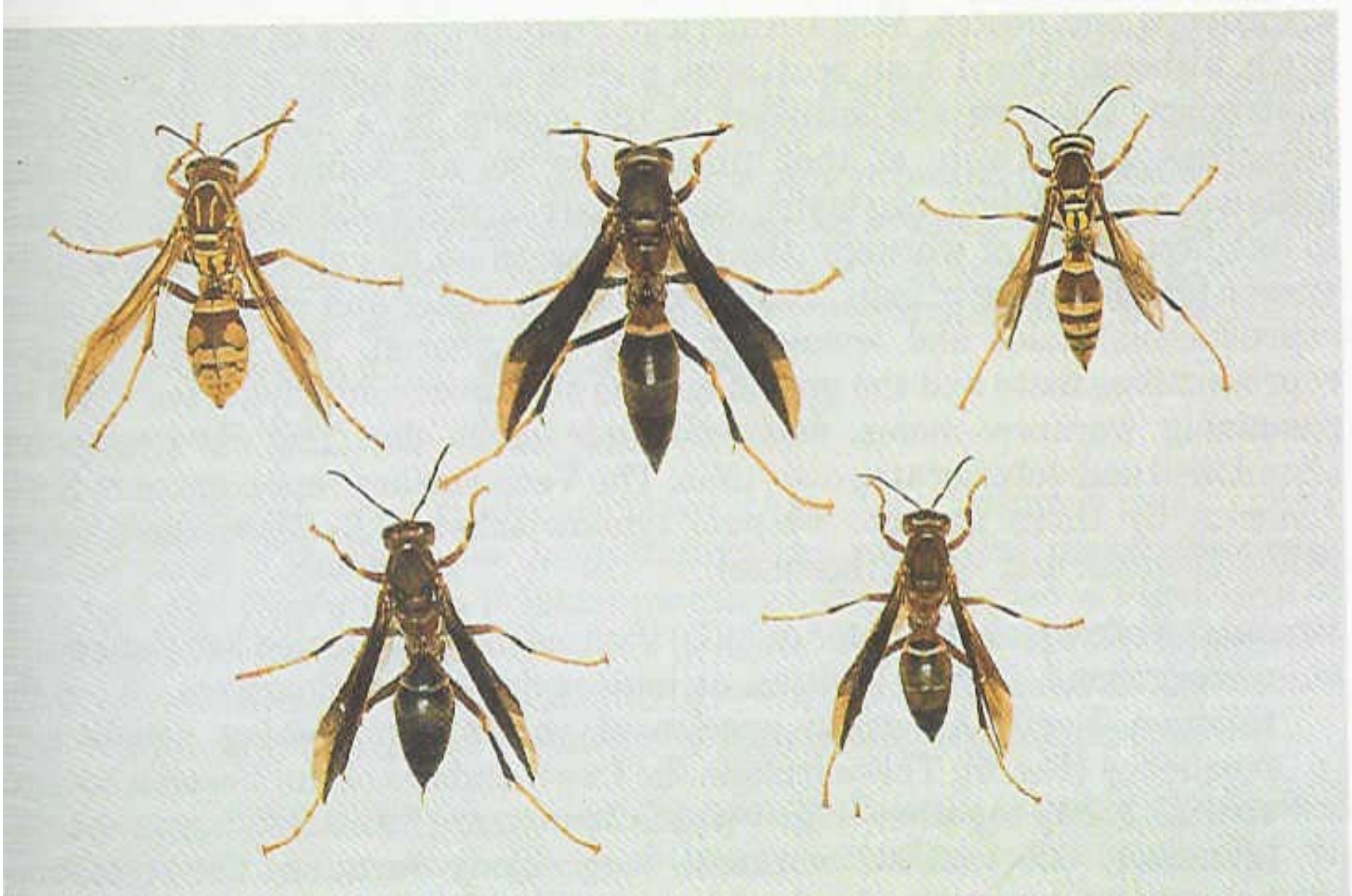


Dolichovespula arenaria nest (aerial yellowjacket or yellow hornet)

Guralnick MW, Benton AW: Entomological Aspects of Insect Sting Allergy. In *Monograph on Insect Allergy*. Levine MI, Lockey RF (eds), 1995



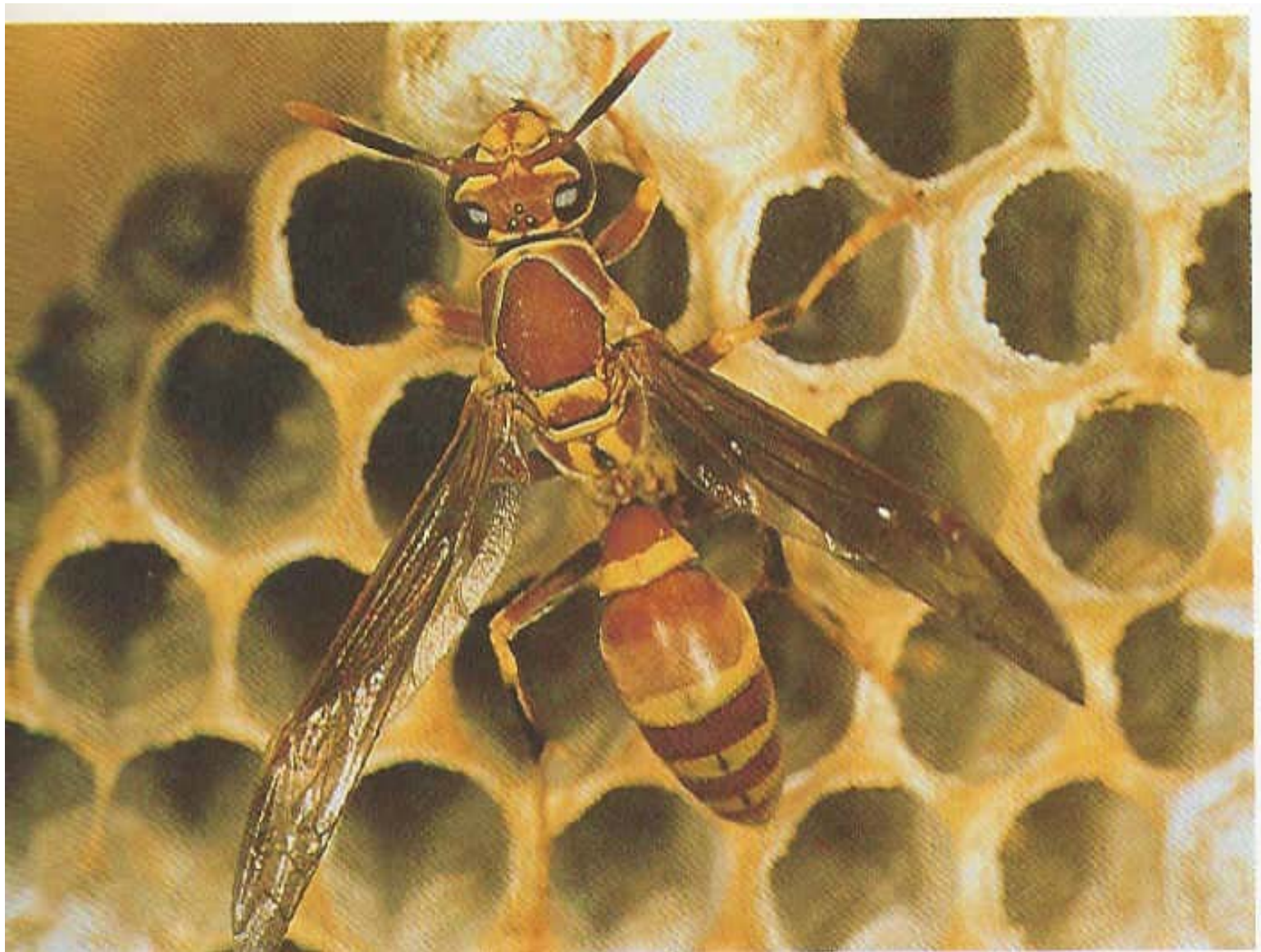




Five North American paper wasps - top row from left to right: *Polistes apachus*, *P. annularis*, *P. exclamans*. Bottom row from left to right: *P. metricus*, *P. fuscatus*.

Guralnick MW, Benton AW: Entomological Aspects of Insect Sting Allergy. In *Monograph on Insect Allergy*. Levine MI, Lockey RF (eds), 1995





Polistes exclamans worker on nest (paper wasp)

Guralnick MW, Benton AW: Entomological Aspects of Insect Sting Allergy. In *Monograph on Insect Allergy*. Levine MI, Lockey RF (eds), 1995





Honeybee leaves a stinger





Bumble bee rarely causes problems



Species of Fire Ants in the United States

- *Solenopsis invicta*
- *Solenopsis richteri*
- *Solenopsis geminata*
- *Solenopsis xyloni*
- *Solenopsis aurea*



(a) The Red Imported Fire Ant (*Solenopsis invicta*)



(b) *Monomorium* sp, a harmless native ant, demonstrating the similarity between the two species

Solley GO, Vanderwoude C, Knight GK.. Anaphylaxis due to Red Imported Fire Ant Sting. Medical Journal of Australia, 3 June 2002 176(11):521-523

Reactions to Fire Ants

- Pustule – normal reaction
- Pustule – secondary infection
- Large local reaction
- Neurologic sequelae
- Systemic reactions – similar to other Hymenoptera

Histology of Sting

- Few minutes
- 24 hours
- 72 hours
- Edema
- PMN and lymphocytes in a pustule
- Eosinophils and plasma cells



Solley GO, Vanderwoude C, Knight GK. Anaphylaxis due to Red Imported Fire Ant Sting. The Medical Journal of Australia, 3 June 2002 176(11):521-523



Diabetic patient stung 10,000 times in nursing home

Proteins, Peptides and Biogenic Amines of Venom

Honeybee

Phospholipase A2*

Hyaluronidase*

Acid phosphatase²*

Melittin*

Apamin

Mast cell degranulating peptide

Norepinephrine

Dopamine

Histamine

Vespids¹

Phospholipase*

Hyaluronidase*

Antigen 5*

Acid phosphatase*

Protease

Kinin

Histidine decarboxylase

Cholinesterase

Mastoparan

Norepinephrine

Epinephrine

Acetylcholine

Serotonin

Histamine

* Identified as an allergen

¹ Includes white faced hornet, yellow-jacket and wasp.

Not all components listed have been demonstrated in each genus or species.

² Acid phosphatase activity demonstrated as associated with an allergenically active fraction.

Monograph on Insect Allergy: Levine, Lockey (eds), p 18, 1986

Selected Biochemical and Physicochemical Properties of Some Hymenoptera Venom Components

Venom	Allergen*	Common Name	Molecular Weight (Daltons)
Honeybee	Api m 1	Phospholipase A ₂	13,000
	Api m 2	Hyaluronidase	45,000
	Api m 3	Melittin	2,840
	Api m 4	Acid phosphatase	49,000

* World Health Organization allergen nomenclature

Selected Biochemical and Physicochemical Properties of Some Hymenoptera Venom Components

Venom	Allergen*	Common Name	Molecular Weight (Daltons)
Vespids	Dol m 1	Phospholipase A ₁	37,000
	Dol m 2	Hyaluronidase	43,000
	Dol m 3	Acid phosphatase	49,000
	Dol m 5	Antigen 5	23,000

* World Health Organization allergen nomenclature

IFA Venom Content (*Solenopsis invicta*)

- 99% 2-6 disubstituted piperdines
- 0.1% protein

In Vitro Biologic Activities of Imported Fire Ant Venom

1. Hemolytic
2. Insecticidal
3. Cytotoxic
4. Activates alternate complement pathway

Selected Biochemical and Physicochemical Properties of Some Hymenoptera Venom Components

Venom	Allergen*	Common Name	Molecular Weight (Daltons)
Fire Ant	Sol i 1	Phospholipase	38,000
	Sol i 2		13,000
	Sol i 3	Antigen 5-like protein	24,000
	Sol i 4		13,000

* World Health Organization allergen nomenclature

Summary of Studies of Cross-Reactivity of Vespid Venoms

- There is a major **cross-reactivity** between or among:
 - the different **yellowjacket** species, with one exception, *V. squamosa*
 - different *Polistes* (wasp) species
 - **two major aerial nesting yellowjackets** (“hornets”) not true hornets: yellow hornet (*Dolichovespula arenaria*) and white faced hornet (*Dolichovespula maculata*)
 - **Yellowjackets and aerial nesting yellowjackets** (“hornets”)
 - **Various bees**
- There is **limited cross-reactivity** between *Polistes* (paper wasps) and **other vespids** (yellowjackets and aerial nesting yellowjackets [hornets]).
- There is **no cross-reactivity** between **bees** and **other species**

Epidemiology

- Systemic reaction to insect stings can occur at any age, after any number of uneventful stings
- 2 million venom allergic people (United States)
- 30 to 50 deaths a year (United States)
- Fatalities most common among adults (40 to 69 years old)
- One half of fatal reactions occur in individuals with no previous history of serious reaction to a sting
- 30 to 60% Risk of systemic reaction to a subsequent sting in patients with evidence of serum specific IgE

Nat Ctr for Health Statistics 2002, Insect Sting Deaths (USA) 1980-99

Golden, "Stinging Insect Allergy," in Adkinson, *et.al.*, *Middleton's Allergy Principles and Practice*, Sixth Ed., 2003:1475-

Levine and Lockey, *Monograph on Insect Allergy*, Fourth Ed., 2003

Classification of Insect Sting Reactions

Normal

Immediate, local, transient

Large local

Delayed, prolonged, progressive

Systemic

Immediate, generalized

Other

Toxic, serum sickness, neuropathy



Large local reaction. Courtesy of Dr. DeShazo

Toxic and Unusual Reactions

- Toxic Reactions
 - Commonly after multiple simultaneous stings (often Africanized honeybee)
 - Serum sickness
 - Neuropathies
 - Guillain-Barre syndrome
 - Seizures (fire ant)
 - Rhabdomyolysis
 - Delayed cold urticaria in IgE positive individuals

Moffitt, *et.al.*, *J All Clin Immunol*, 2004, 114:869-886.

Reisman, Robert E. "Clinical Aspects of Hymenoptera Allergy," in Levine and Lockey, *Monograph on Insect Allergy*, Fourth Ed., 2003

Systemic Reactions

- Anaphylaxis to an Hymenoptera sting is IgE-mediated and presents with some or all of the signs and symptoms of this syndrome

Neurologic

Dizziness, weakness, syncope, seizures

Eye

Pruritus, conjunctival injection, lacrimation

Nose

Pruritus, congestion, sneezing,
clear rhinorrhea

Upper airway

Hoarseness, stridor,
oropharyngeal or laryngeal edema,
cough, complete obstruction

Cardiovascular

Tachycardia, hypotension, arrhythmias,
cardiac arrest

Lower airways

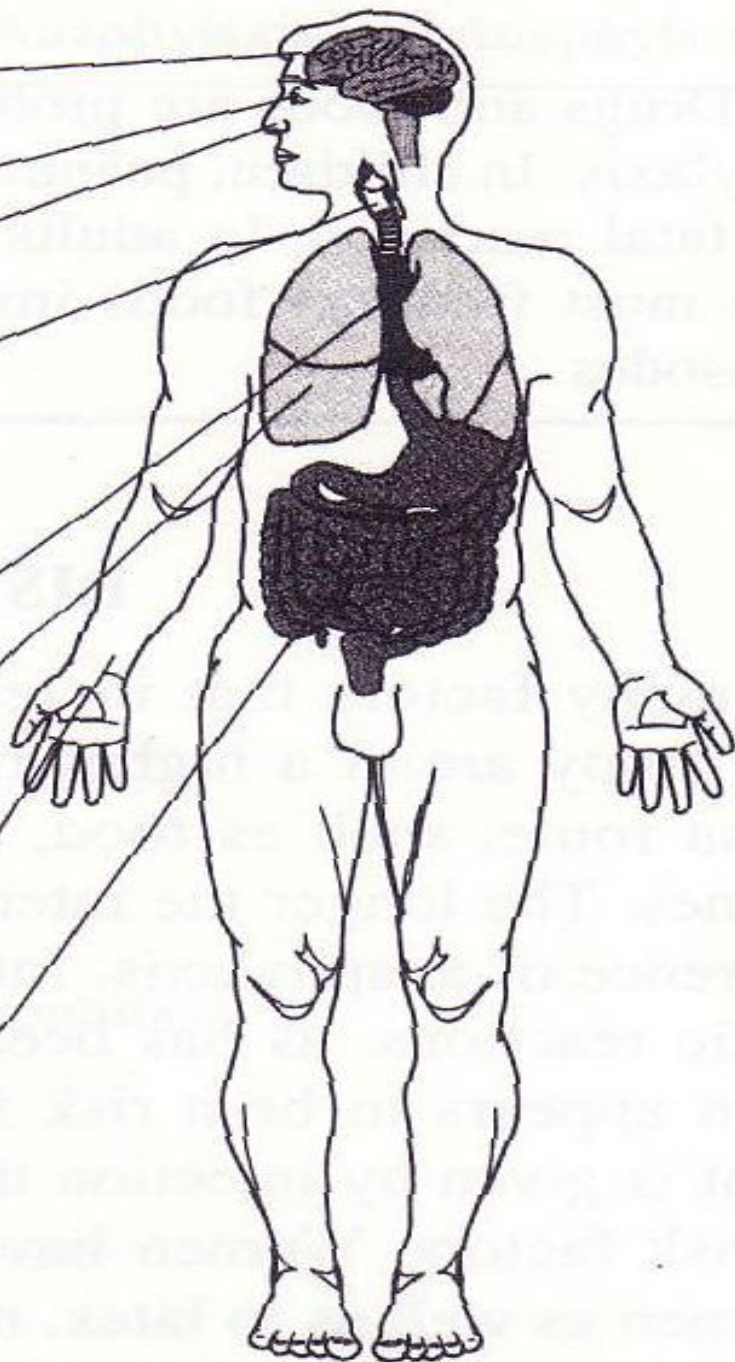
Chest tightness, dyspnea, tachypnea,
use of accessory muscles, cyanosis,
bronchospasm, respiratory arrest

Skin

Sensation of warmth, flushing, erythema,
general pruritus, urticaria, angioedema

Gastrointestinal

Nausea, vomiting, cramping abdominal
pain, diarrhea (often bloody)



Risk of Systemic Reaction in Untreated Patients with History of Positive Skin Tests

Original Sting Reaction		Risk of Systemic Reaction	
Severity	Age	1-9 Year	10-20 Year
None	Adult	17%	?
Large local	All	10%	10%
Cutaneous Systemic	Child	10%	5%
	Adult	20%	10%
Anaphylaxis	Child	40%	30%
	Adult	60%	40%

Diagnosis

- History is critical, i.e., physical and geographical location, time of year, location of insect nest
- Skin tests: more specific than serum venom specific IgE (RAST)
- After a sting reaction, skin tests can remain negative for 4-6 weeks after a sting
- Negative skin tests may also represent loss of sensitivity with distant history of sting reaction
- Skin test→RAST→repeat skin test→repeat RAST (wait at least 6 weeks to repeat sequence)

Moffitt, *et.al.*, *J All Clin Immunol*, 2004, 114:869-886.

- 1989 study found 15-17% incidence of positive skin tests in individuals with no history of SAR to insect sting

Golden, *et.al.*, *JAMA*, 1989, 262:240-244.

Data Summary for Safety of Skin Testing

- 64/3236 (2%) subjects had a systemic reaction during venom skin test:
 - 13/3236 (0.4%) were severe
 - 13/64 (20%) were possibly vasovagal
 - 6/64 (9%) demonstrated no symptoms of immediate type hypersensitivity

Lockey et al., *JACI*, 84:967, 1989

In vitro Testing

- Serum venom specific IgE (“RAST”)
- Nonspecific: This may be positive in 3-20% of people with a history of insect sting but NO history of systemic allergic reaction to insect sting. The incidence was highest in those whose stings were in the previous 3 years
- 20% of skin test positive patients have a negative venom-specific IgE; 10% of RAST positive patients have a negative skin test
Moffitt, et.al., J All Clin Immunol, 2004, 114:869-886.
- Serum specific IgE positive: clear association with an elevated risk of systemic reaction to a sting
- A 1989 study of 50 positive RAST patients showed that absolute titers of serum venom specific IgE were **unrelated** to the severity of reaction to insect sting

Data Summary of Hymenoptera Sting Study in Over 3,000 Subjects

- The degree of severity did not correlate with:
 - the severity of the most recent sting prior to entry into the study
 - the most severe historical sting systemic reaction
 - the most severe systemic reaction during venom skin testing
 - the total dose of the venom
 - the degree of skin testing reactivity
 - the lowest concentration of venom yielding a positive skin test

Indications for Stinging Insect Immunotherapy

<i>Classification of Sting Reaction by History</i>	<i>Venom Skin Test</i>	<i>Immunotherapy</i>
Large local	Not indicated	No
Systemic (cutaneous)	Positive	Yes (USA vs EU)
	Negative	No
Children < 16 years	Positive	No
Systemic (mod- severe)	Positive	Yes
	Negative	No
Toxic	Not indicated	Not indicated

Allergen Venom Extracts Used to Constitute Vaccines

- Honeybee (*Apis mellifera*)
- Yellowjacket (*Vespula spp.*)
- Yellow “Hornet” (*Dolichovespula arenaria*)
- White Faced “Hornet” (*Dolichovespula maculata*)
- Wasp (*Polistes spp.*)
- Mixed Vespid (Yellowjacket, Yellow “Hornet” & White Faced “Hornet”)

Dosing Regimen – Interval Between Injection

- Maintenance injections are recommended every 4 weeks for one year, then every 6 weeks. Injection intervals have been increased to 2 to 3 months in some clinics.
- Maintenance dose – 100 μg is recommended.

Safety of Venom Immunotherapy

- 171/1410 (12%) experienced 327 treatment systemic reactions
- The average severity was moderate
- The incidence of pruritus and angioedema/urticaria was similar with mild, moderate or severe systemic reactions and thus not predictive of reaction severity

Lockey et al., *JACI*, 86, 1990

Risk Factors for IT

- Female sex
- IT with bee venom vaccine
- Rapid dose escalation or RUSH IT
- Pre-existing allergic rhinitis
- NOT age
- Mastocytosis, elevated total tryptase

Reichmuth and Lockey "Adverse Reactions to Skin Testing and Immunotherapy..." in Levine and Lockey, *Monograph on Insect Allergy*, Fourth Ed., 2003

- Some evidence refutes that β blocker therapy is a predictor of increased risk

Duration of Therapy

- Stop therapy when loss of skin test reactivity occurs
- When there is a fall in serum venom specific IgE to undetectable levels
- After 3-5 years? The more serious the reaction, the more likely IT should be continued.

Potential risk factors related to risk of a re-sting reaction after stopping VIT

- Age; adults > children
- Insect species: honey bee > vespids
- More severe initial anaphylaxis
- Reaction to VIT
- Unchanged skin test reactivity during VIT

Reisman RE. Discontinuation of Venom Immunotherapy. In: *Monograph on Insect Allergy*, Levine MI, Lockey RF (eds), 4th ed.

With Whom Do You Identify?



An 17-year-old male presents with a history, 2 months prior, of a generalized, pruritic rash following a stinging sensation on his leg. The rash was erythematous and raised and lasted 2-3 hours. The rash was treated with oral diphenhydramine. No insect was seen. The event occurred while at the beach in Florida. Pruritic pustules developed on his leg during the 24 hours after the event and resolved over 4-5 days. The best recommendation is to:

- A. perform skin testing with venoms and whole body extract of imported fire ant.
- B. reassure the patient and his family that insect allergy testing is not necessary.
- C. perform skin testing only with whole body extract of imported fire ant.
- D. advise in vitro testing with coelenterate venom (jelly fish).

An 8-year-old child presents with a history, 2 months prior, of a generalized, pruritic rash following a stinging sensation on his leg. The rash was erythematous and raised and lasted 2-3 hours. The rash was treated with oral diphenhydramine. No insect was seen. The event occurred while at the beach in Florida. Pruritic pustules developed on his leg during the 24 hours after the event and resolved over 4-5 days. The best recommendation is to:

- A. perform skin testing with venoms and whole body extract of imported fire ant.
- B. reassure the patient and his family that insect allergy testing is not necessary.
- C. perform skin testing only with whole body extract of imported fire ant.
- D. advise in vitro testing with coelenterate venom (jelly fish).

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- A. Repeat the skin tests in 6 weeks.
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- A. There is a 30-50% chance the test will become negative in 2-5 years.
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